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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/565,466	01/20/2006	Craig N. Schubert	63149A	9819
109 7590 02/25/2009 The Dow Chemical Company Intellectual Property Section P.O. Box 1967 Midland, MI 48641-1967				
			EXAMINER WU, IVES J	
			ART UNIT 1797	PAPER NUMBER
			MAIL DATE 02/25/2009	DELIVERY MODE PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/565,466

Applicant(s)

SCHUBERT ET AL.

Examiner

IVES WU

Art Unit

1797

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 January 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-16 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-16 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SE/IB)
Paper No(s)/Mail Date 7/24/2008; 6/16/2008; 1/7/2008; 11/23/2007
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

- (1). **Claims 1-2, 4-6, 8-9, 13** are rejected under 35 U.S.C. 102(e) as being anticipated by Rochelle "Innovative Stripper Configurations to Reduce the Energy Cost of CO₂ Capture", 2nd Annual Carbon Sequestration Conference, Alexandria, VA, May 5-8,2003, evidenced by Fujii et al (US 5318758A).

As to in a process for removal and recovery of absorbed acid gas from an aqueous treatment Fluid, which Fluid comprises at least one chemically absorbed acid gas and at least one acid gas-absorbing chemical Agent, and the reclamation of at least one such Agent from the treatment Fluid, and in which Process the reclamation is conducted in an endo-thermal Separation Step wherein the Fluid is separated into a) at least one liquid-phase Stream A rich in the absorbing Agent and b) at least one gaseous-phase Stream B rich in the acid gas, and Stream B is thereafter recovered and subjected to compression in a compression Device in **independent claim 1**, Rochelle "Innovative Stripper Configurations to Reduce the Energy Cost of CO₂ Capture" disclose CO₂ capture by absorption/stripping with aqueous monoethanolamine (MEA) is the state-of-the-art technology for CO₂ capture from coal-fired power plants (Abstract, line 1-3). These processes may also be used in CO₂ removal from hydrogen or syngas where the CO₂ is further compressed for production of methanol or enhanced oil recovery or for sequestration (page 1,3rd paragraph), also illustrated in Figures 3 & 4. It is well known that desorption of CO₂ in stripper is endo-thermal Separation Step. As evidenced by Fujii et al (US 5318758A) that exothermal reaction of absorption of CO₂ with MEA (Col. 2, line 49-52). The reverse reaction of desorption of CO₂ from MEA solution would be endo-thermal.

As to improvement comprising: 1) conducting the Separation Step in a pressure Vessel under a pressure that exceeds 50 *psia* and does not exceed about 300 *psia*, while supplying to the Fluid sufficient heat to separate gaseous-phase Stream B from liquid-phase Stream A, and 2) subsequently introducing Stream B under pressure to the intake of the compression device in **independent claim 1**, Separation Step pressure exceeding 130 *psia* in **claim 2**, Rochelle "Innovative Stripper Configurations to Reduce the Energy Cost of CO₂ Capture" disclose Figure 5, which reads on the limitations of instant claim.

As to the step after conducting the Separation Step but before introducing Stream B to the intake of the compression Device, Stream B is treated by passing it to a condenser, cooling it to a temperature that allows the acid gases to pass the condenser but is sufficiently low to remove one or more other condensable gas from Stream B in **claim 4**, as shown in the Figure 3, which illustrates limitations of instant claim.

As to at least one acid gas-absorbing chemical Agent in the treatment Fluid to be alkanolamine comprising from 2 to 6 carbon atoms in **claim 5**, selection of gas-absorbing chemical agent in **claim 6**, Rochelle "Innovative Stripper Configurations to Reduce the Energy Cost of CO Capture" disclose MEA (monoethanolamine).

As to chemical absorbed acid gas of carbon dioxide and steps 1 to 3 in **independent claim 8**, the disclosure of Rochelle is incorporated herein by reference, the most subject matters as currently claimed, have been recited in Applicants' claim 1 and have been discussed therein. It would be obvious to reduce volume of the gas stream after the compression as well known in the art.

As to gas stream after compression to be disposed by injection to an ocean- or sea-bed or into a subterranean chamber or formation in **claim 9**, Rochelle "Innovative Stripper Configurations to Reduce the Energy Cost of CO₂ Capture" discloses carbon dioxide to be further compressed for production of methanol or enhanced oil recovery or for sequestration (page 1, paragraph 3).

As to stripping acid gas from acid gas absorption Fluid taking place in a pressure Vessel at a pressure in excess of about 55 *psia* and below about 300 *psia* in **claim 13**, the disclosure of Rochelle is incorporated herein by reference, the most subject matter as currently claimed, has been recited in Applicants' claim 2, and has been discussed therein.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

(2). **Claims 3, 10, 12 and 14-16** are rejected under 35 U.S.C. 103(a) as being unpatentable over Rochelle "Innovative Stripper Configurations to Reduce the Energy Cost of CO₂ Capture", presented at 2nd Annual Carbon Sequestration Conference..

As to Separation Step pressure exceeding 130 *psia* in **claim 3**, in view of the Figure 5 and teaching of Rochelle, it would be obvious to have the pressure in Separation Step exceeding 130 *psia* by recycle the pressurized CO₂ at 130 *psia* back to the stripper.

As to Separation step being conducted at a temperature in excess of 280 deg. F and below 400 deg. F in **claims 10 and 12**, Rochelle "Innovative Stripper Configurations to Reduce the Energy Cost of CO₂ Capture" discloses a simple stripper being operated at 1-2 atm, the temperature to be 100 to 120 O° (212 - 248 deg. F) in stripper, it would be obvious to have temperature to be operated in excess of 280 deg. F and below 400 deg.F in order to optimize the performance of reboiler as well as flow of solvent, output of carbon dioxide when the pressure to be operated more than 2 atm for the stripper.

As to stripping acid gas from acid gas absorption Fluid taking place in a pressure Vessel at a pressure in excess of about 130 *psia* and below about 300 *psia* in **claim 14**, pressure in excess of about 50 *psia* and below about 200 *psia* in **claim 15**, pressure in excess of about 50 *psia* and below about 155 *psia* in **claim 16**, in view of the Figure 5 and teaching of Rochelle, it

would be obvious to have the pressure in Separation Step exceeding 130 *psia* by recycle the pressurized CO₂ at 130 *psia* back to the stripper, or recycle the gas at 50 *psia* in compressor back to the stripper.

(3). **Claims 7 and 11** are rejected under 35 U.S.C. 103(a) as being unpatentable over Rochelle "Innovative Stripper Configurations to Reduce the Energy Cost of CO₂ Capture" in view of Asprien et al (US 7004997B2).

As to at least selection of one co-solvent to be included in treatment Fluid for acid gas in **claims 7 and 11**, Rochelle discloses MEA, but **do not teach** co-solvent as claimed.

However, Asprien et al (US 7004997B2) **teach** method for removal of acid gases from a gas flow (Title). It is known to remove the unwanted acid gas constituents from the gases by gas scrubbing with aqueous or nonaqueous mixtures of organic solvents as adsorbents. In this process both physical and chemical solvents are used. Known physical solvents are, for example, cyclooctamethylenesulfone (sulfolane), N-methylpyrrolidone and N-alkylated piperidones. The chemical solvents which have proven themselves industrially are, in particular, the aqueous solutions of primary, secondary and tertiary aliphatic amines and alkanolamines such as monoethanolamine (MEA), diethanolamine (DEA), monomethylethanolamine (MMEA), diethylethanolamine (DEEA), triethanolamine (TEA), diisopropanolamine (DIPA) and methyldiethanolamine (MDEA) (Col. 1, line 36-48).

In view of the recognized functional equivalent adsorbents for acid gas such as MEA, Sulfolane disclosed by Asprien et al, and by Applicants, it would have been obvious at time of the invention to include physical solvent such as sulfolane with MEA disclosed by Rochelle in scrubbing solvent of Rochelle, since each member of the combination is known individually as an effective adsorbent and the person of ordinary skill in the art would have expected such a combination to work in an additive or cumulative manner. *In re Kerkhoven*, 626 F.2d 846, 850, 205 USPQ 1069, 1072 (CCPA 1980).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to IVES WU whose telephone number is (571)272-4245. The examiner can normally be reached on 8:00 - 5:00.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Duane Smith can be reached on 571-272-1166. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Examiner: Ives Wu

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Date: February 19, 2009

/DUANE SMITH/

Supervisory Patent Examiner, Art Unit 1797